Bearing Calculation with KISSsoft and SKF Cloud Services

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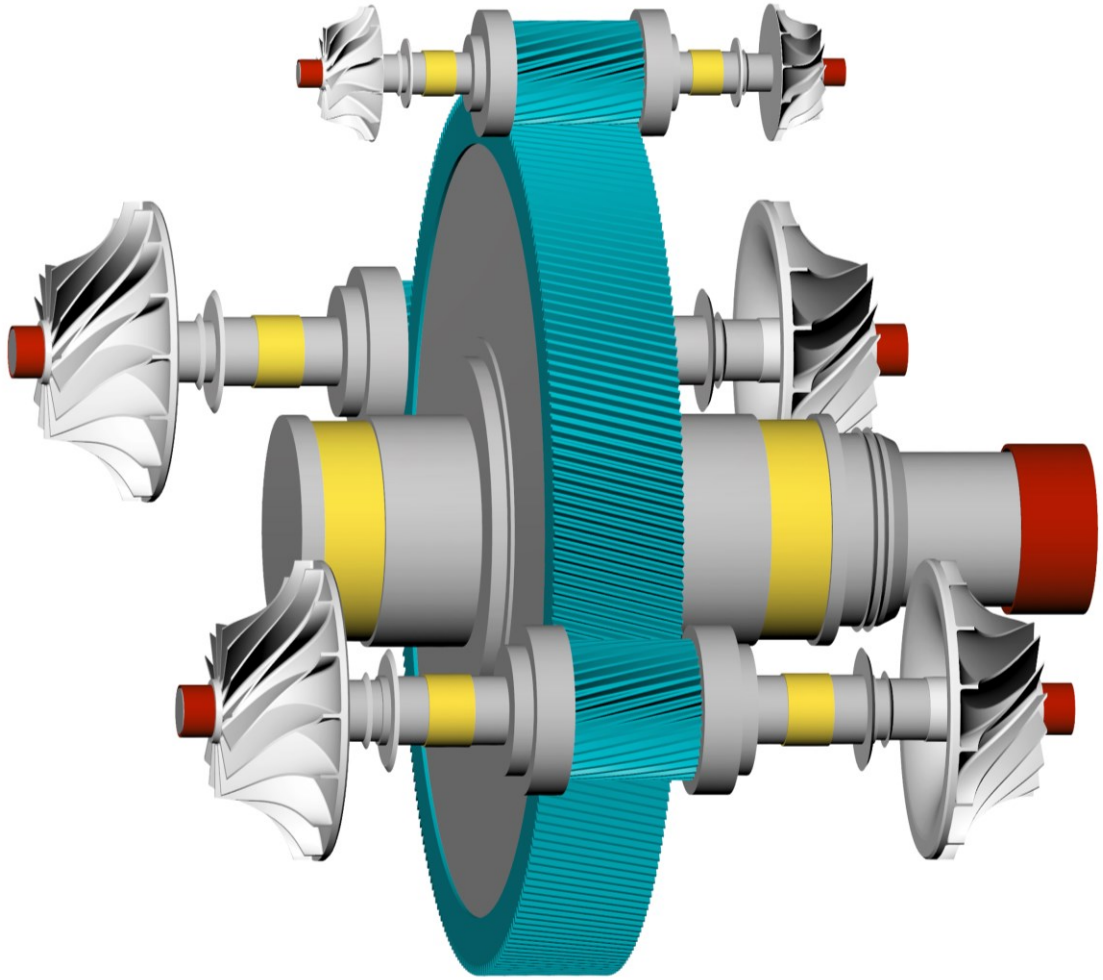

KISSsoft

Content

- **Calculation methods** for rolling bearings in KISSsoft
- Application and advantages of calculation according to **ISO/TS 16281**
- **SKF Cloud Service**: Accurate rolling bearing stiffness and rating life directly via SKF service

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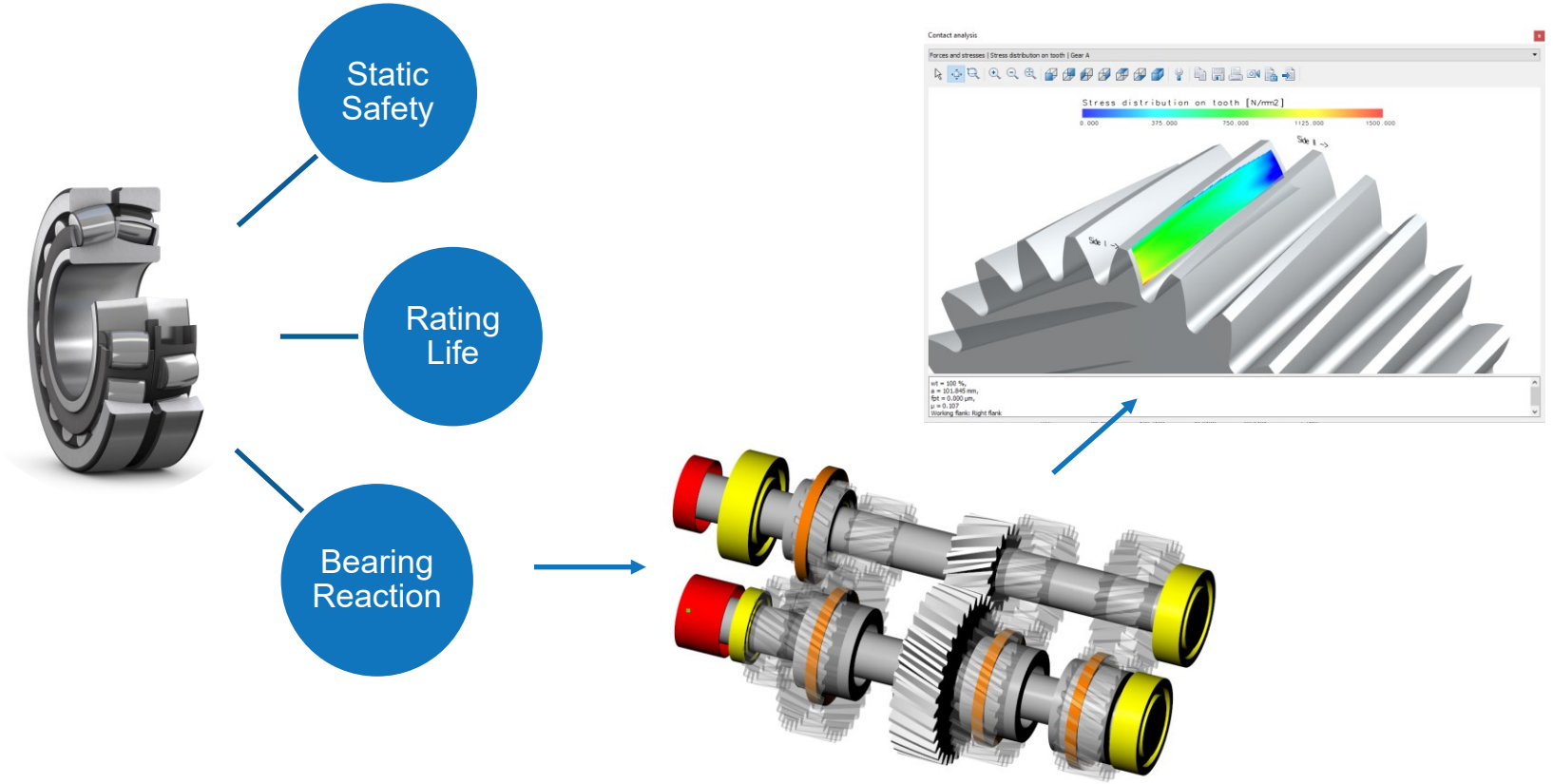
Objective of calculation methods for rolling bearings



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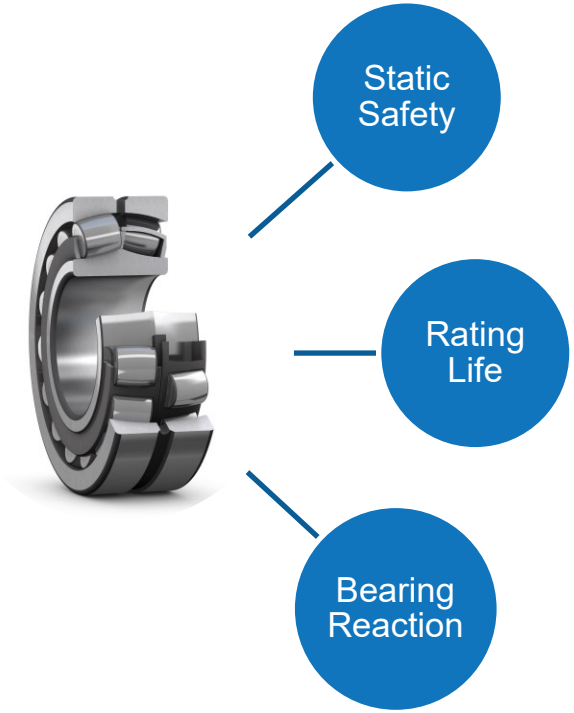

Standardized methods

ISO 76:2006
Static load ratings

ISO 281:2007
Dynamic load ratings and rating life

ISO/TS 16281:2008
Methods for calculating the modified reference rating life for universally loaded bearings

Proprietary

Open, manufacturer specific instructions (catalog)

Manufacturer-internal-use-only implementations

KISSsoft

Calculation methods for rolling bearings in KISSsoft

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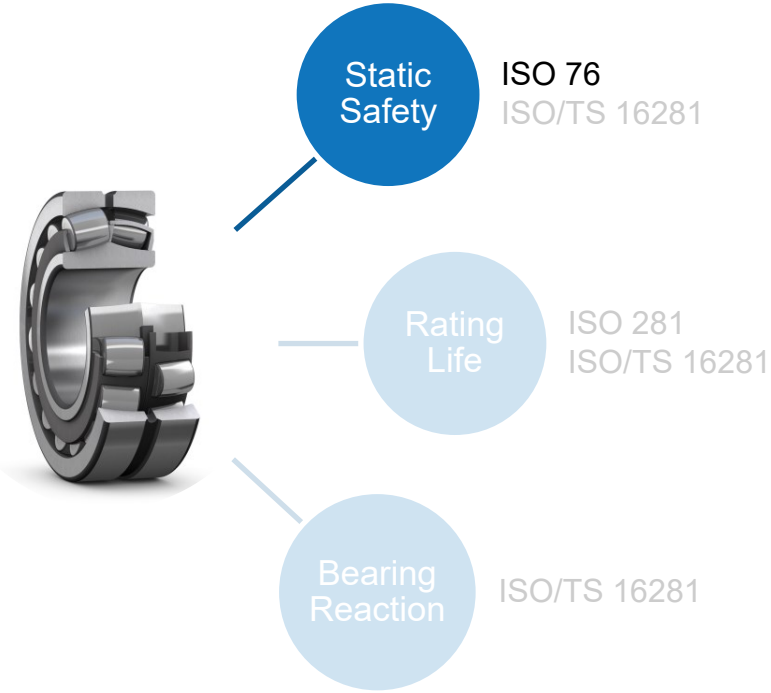


Calculation methods for rolling bearings in KISSsoft

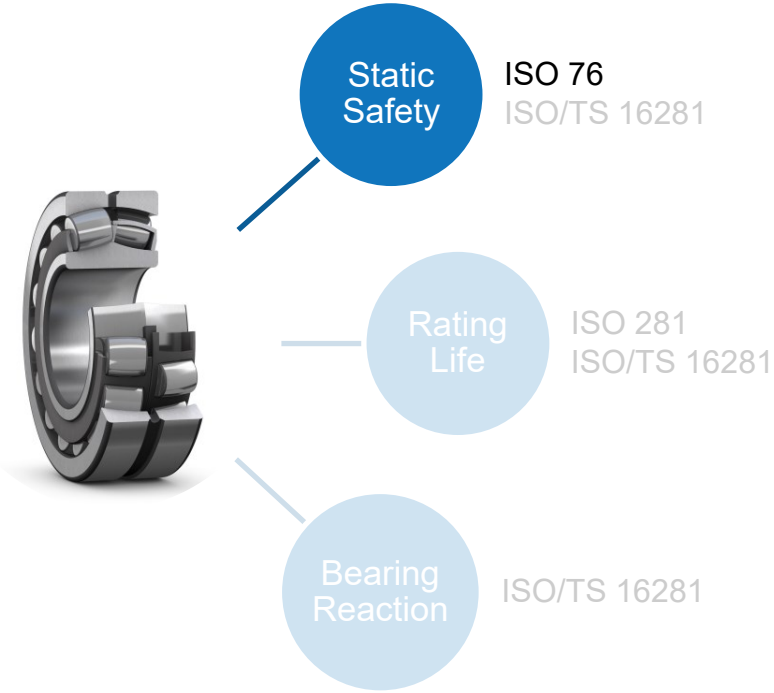
Standardized methods: ISO 76:2006 (Static load ratings)

Static safety factor

$$S_0 = \frac{C_0}{P_0}$$

Static equivalent load

$$P_0 = X_0 F_r + Y_0 F_a$$



Calculation methods for rolling bearings in KISSsoft

Standardized methods

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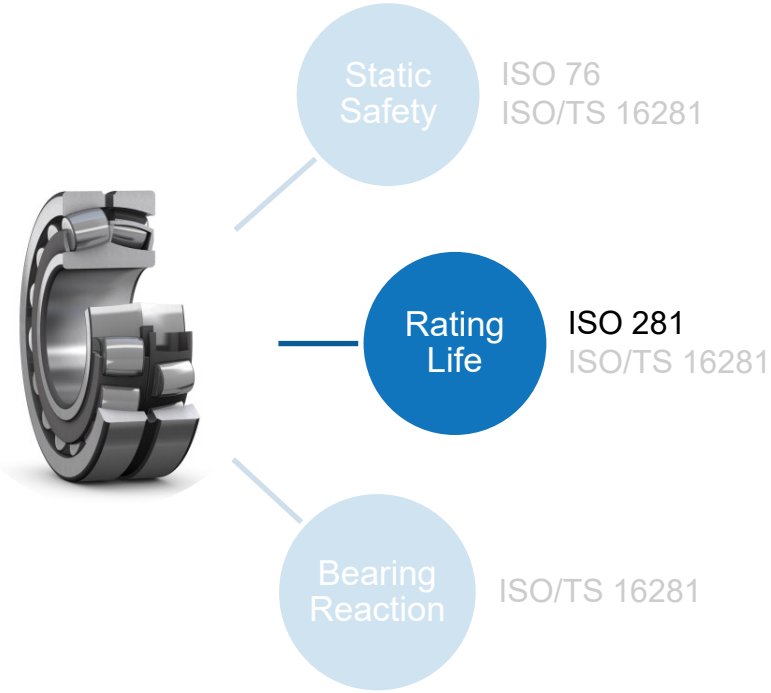


Calculation methods for rolling bearings in KISSsoft

Standardized methods: ISO 281:2007 (Dynamic load ratings and rating life)

Basic rating life

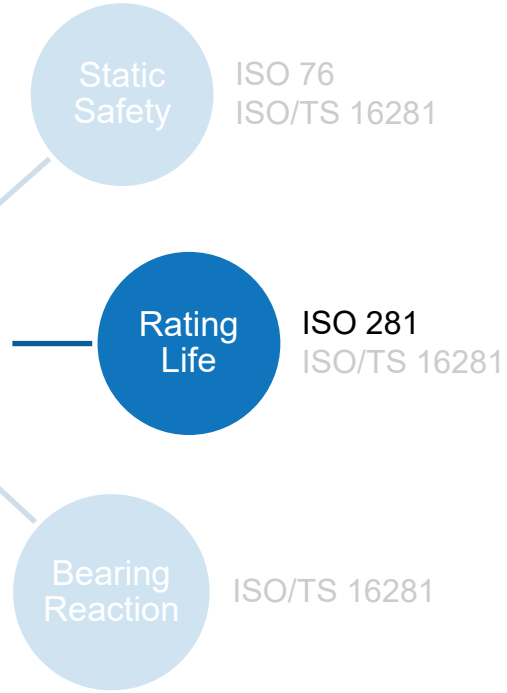
$$L_{10}[10^6\text{revs}] = \left(\frac{C}{P}\right)^p$$

Dynamic equivalent load

$$P = XF_r + YF_a$$

Modified rating life

$$L_{nm} = a_1 \cdot a_{ISO} \cdot L_{10}$$



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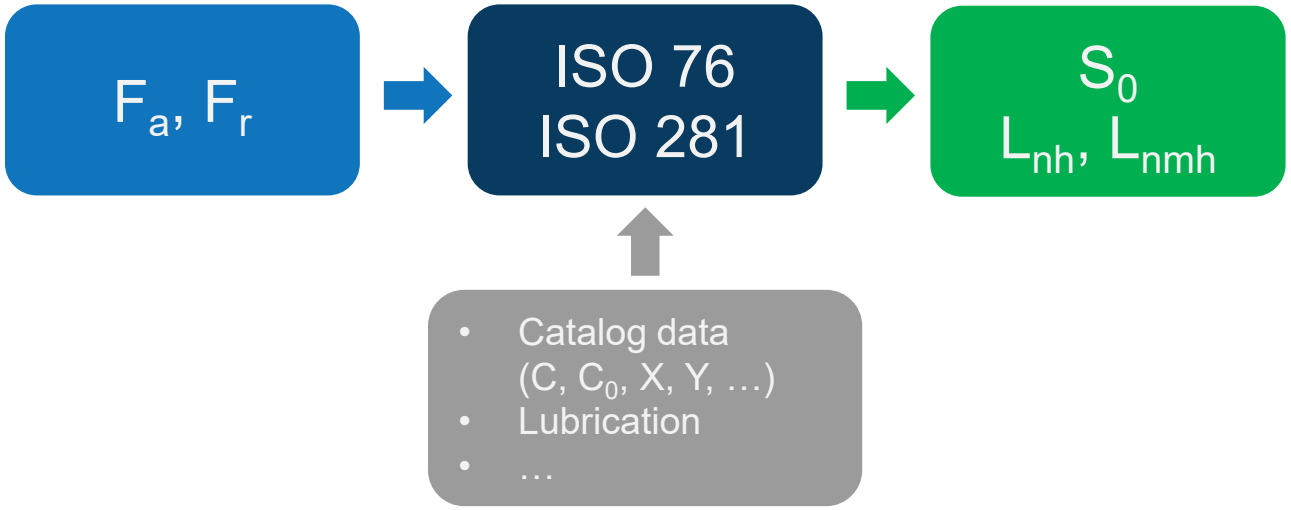
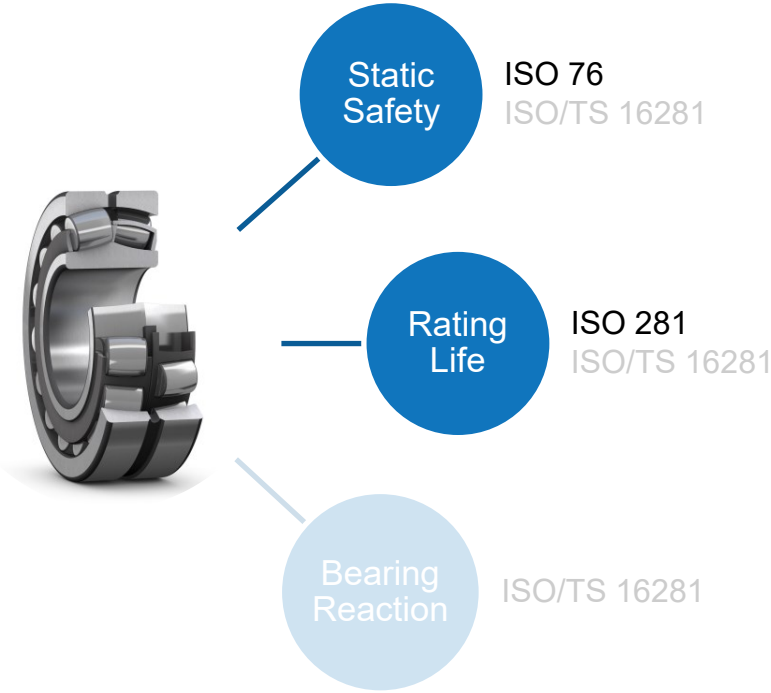
Calculation methods for rolling bearings in KISSsoft

Standardized methods: ISO 76:2006, ISO 281:2007

Bearing reaction is an input to the calculation to be modeled and calculated separately





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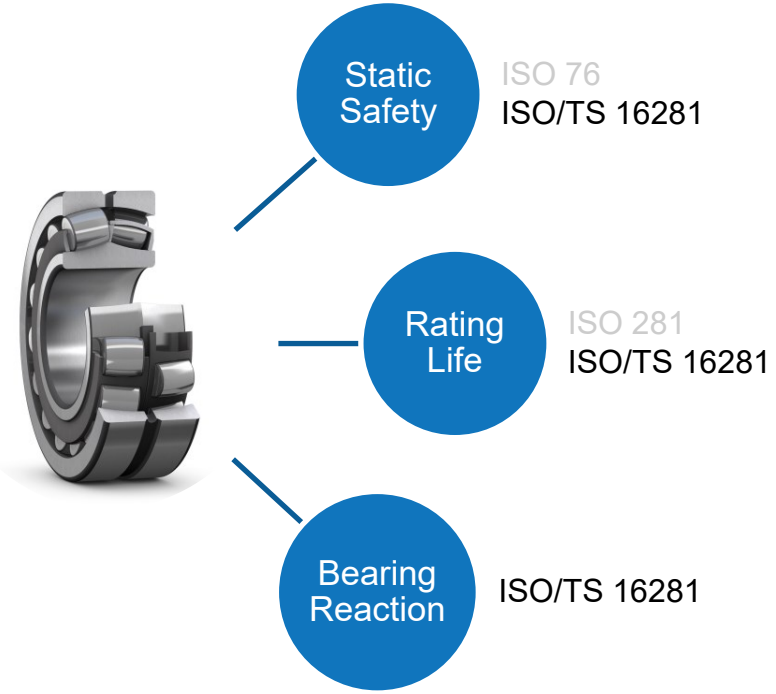
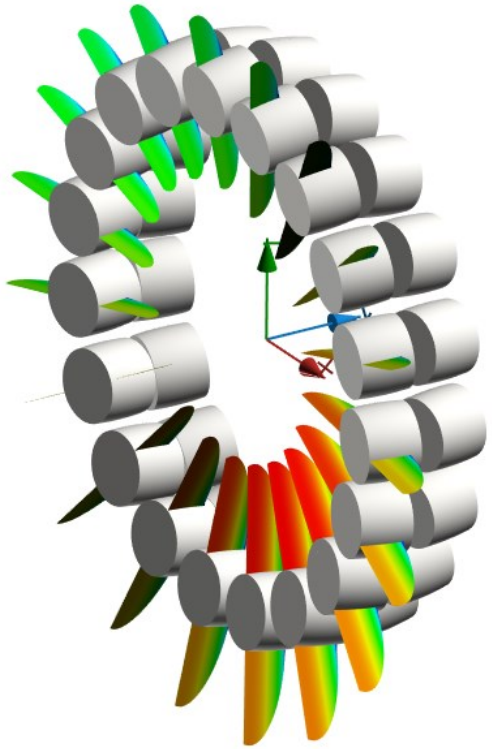
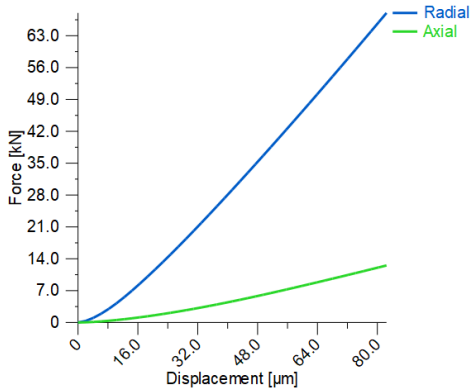


Advantages of calculation according to ISO/TS 16281

Standardized methods: ISO/TS 16281:2008 (considering internal geometry)





$$L_{10r} = \left(\left(\frac{Q_{ci}}{Q_{ei}} \right)^{-10/3} + \left(\frac{Q_{co}}{Q_{eo}} \right)^{-10/3} \right)^{-9/10}$$

- Static Safety — ISO 76, ISO/TS 16281
- Rating Life — ISO 281, ISO/TS 16281
- Bearing Reaction — ISO/TS 16281

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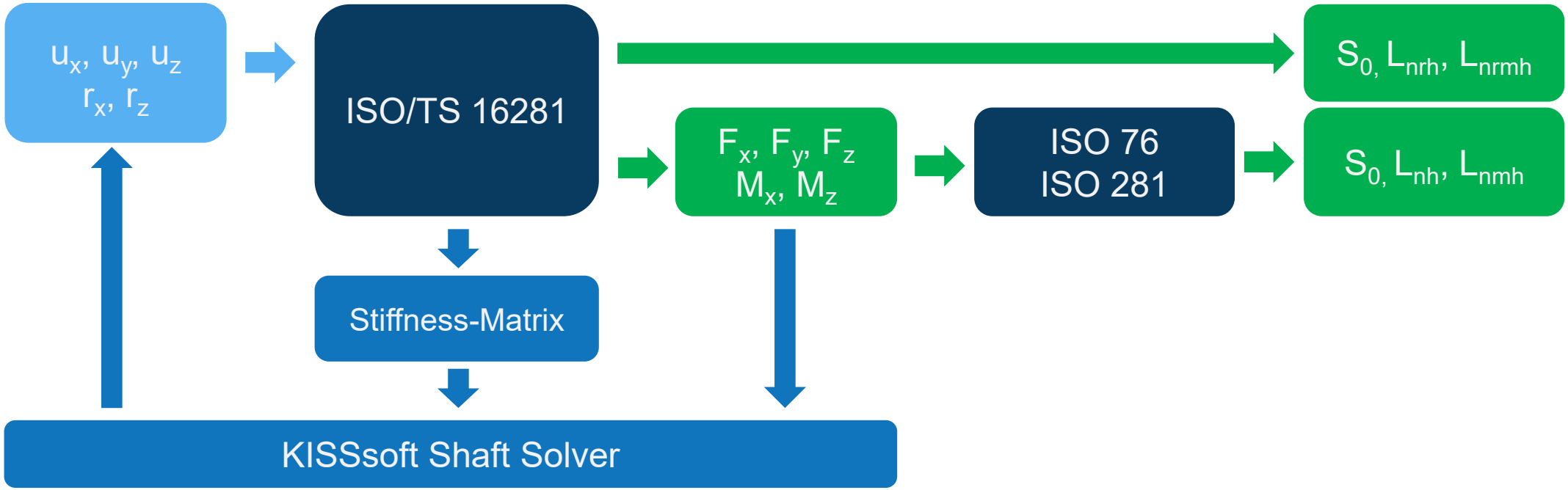
Advantages of calculation according to ISO/TS 16281

Standardized methods: ISO/TS 16281:2008 (considering internal geometry)

Bearing reaction is a result of the calculation (requires internal iterations)



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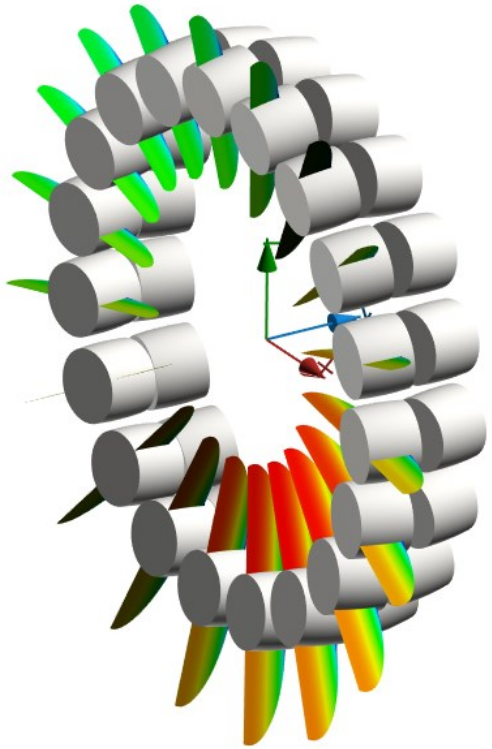
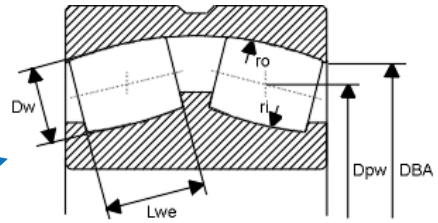


?



- The macro geometry is typically only available in individual cases
- Micro geometry is almost never available

Static Safety — ISO 76, ISO/TS 16281

Rating Life — ISO 281, ISO/TS 16281

Bearing Reaction — ISO/TS 16281

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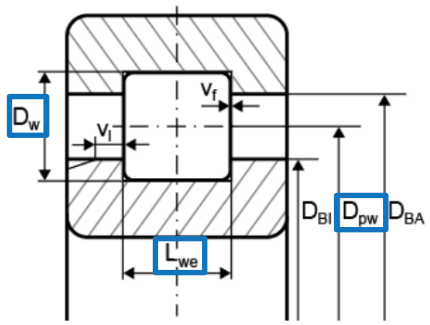
Advantages of calculation according to ISO/TS 16281

Standardized methods: ISO/TS 16281:2008 (considering internal geometry)

ISO 76

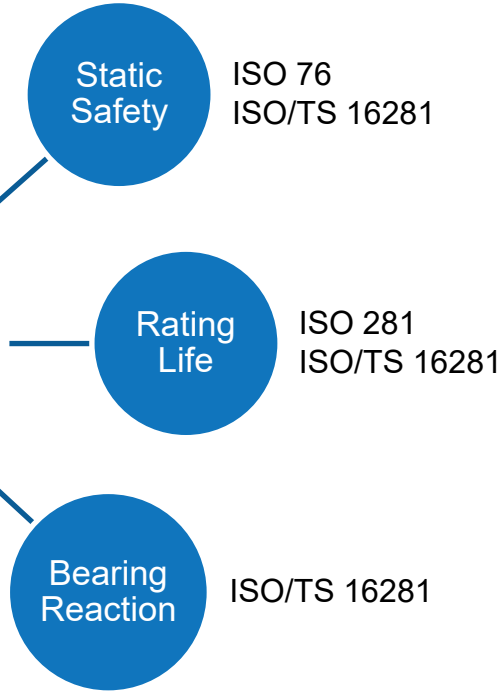
$$C_{0r} = 44 \cdot \left(1 - \frac{D_{we} \cdot \cos\alpha}{D_{pw}}\right) \cdot i \cdot Z \cdot L_{we} \cdot D_{we} \cdot \cos\alpha$$



ISO 281

$$C_r = b_m \cdot f_c \cdot (i \cdot L_{we} \cdot \cos\alpha)^{\frac{7}{9}} \cdot Z^{\frac{3}{4}} \cdot D_{we}^{\frac{29}{27}}$$

3+ unknowns, 2 equations and additional constraints



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+ hard constraints (physical limits, design features)
+ soft constraints (typical ratios and features)

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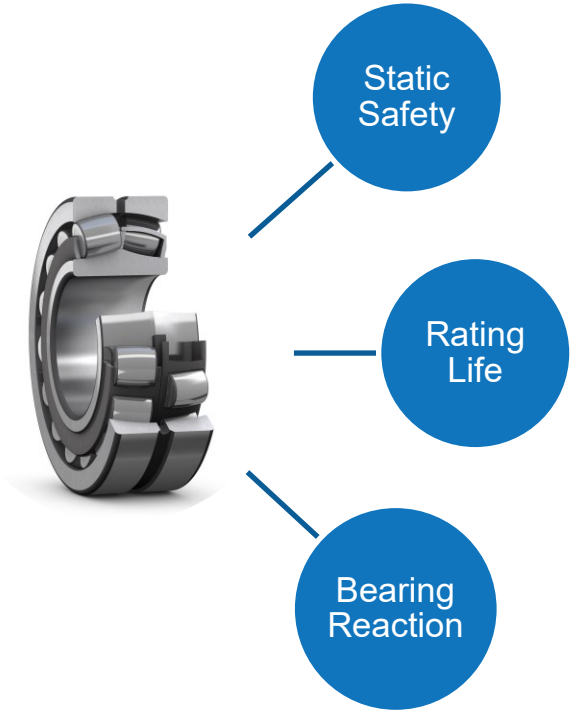
Objective of calculation methods for rolling bearings



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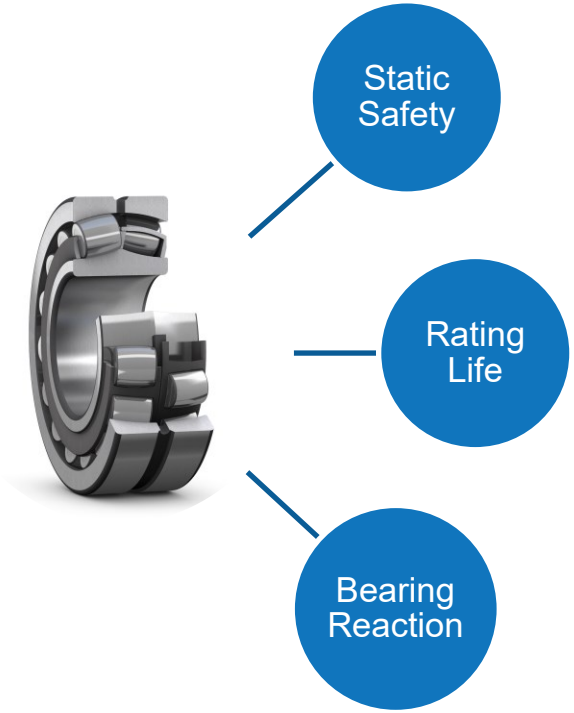

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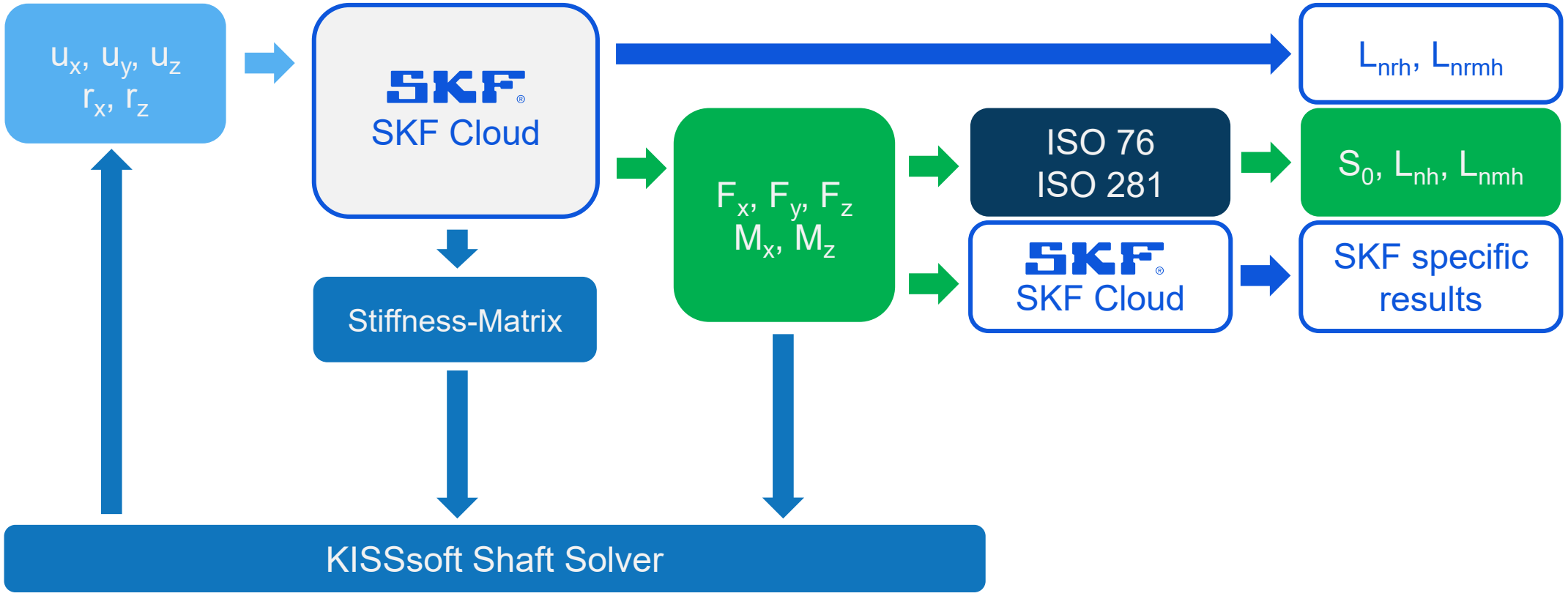
SKF Cloud Services

Use SKF bearing stiffness and calculate ISO/TS 16281 reference rating life



Bearing Calculation with KISSsoft and SKF Cloud Services

- ✓ **Calculation methods** for rolling bearings in KISSsoft
- ✓ Application and advantages of calculation according to **ISO/TS 16281**
- ✓ **SKF Cloud Service**: Accurate rolling bearing stiffness and life directly via SKF service

More cloud services also to other bearing manufacturers to be added in future KISSsoft releases

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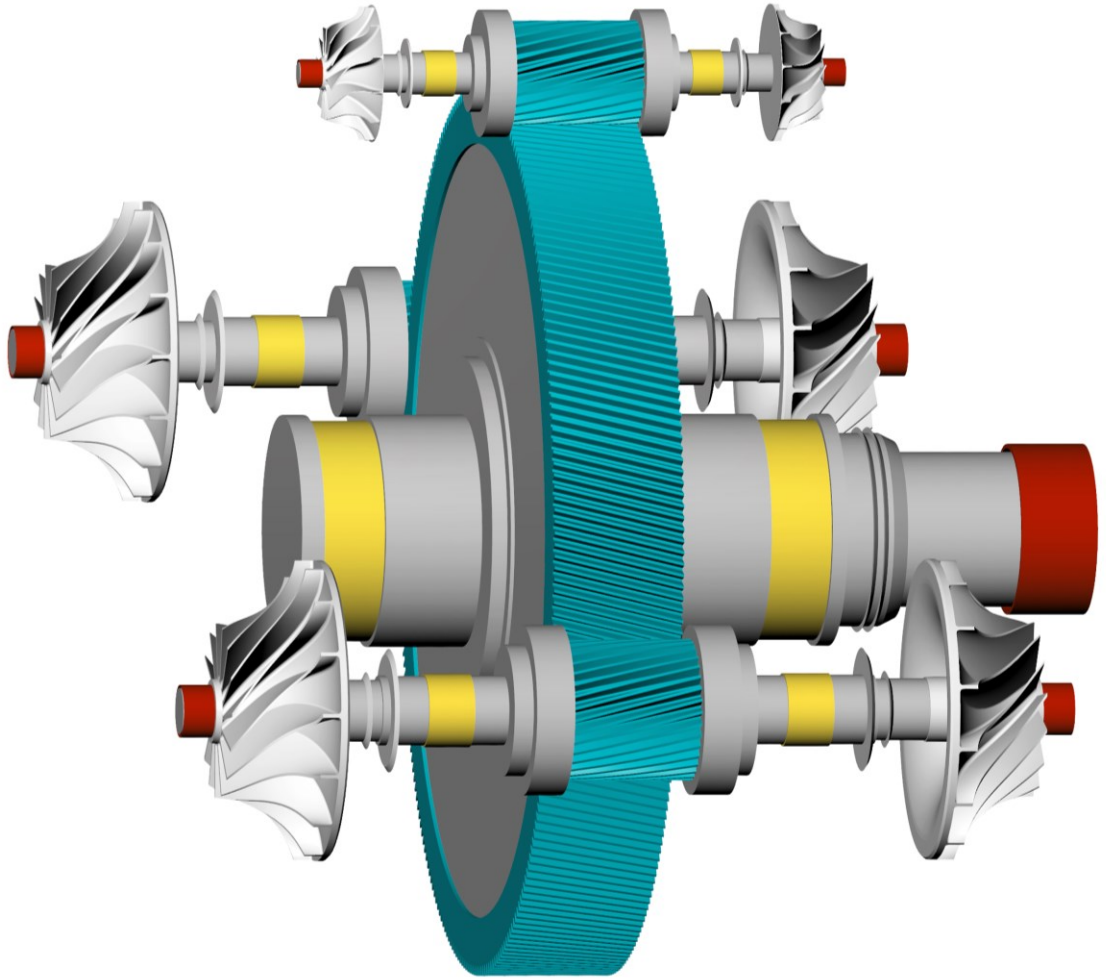
Thank you for your attention!



Sharing Knowledge

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